

Practice: 436 - Irrigation Reservoir**Scenario: #1 - Delta Embankment Reservoir****Scenario Description:**

This is a very large embankment reservoir with a 18" diameter drain pipe through the embankment controlled by a canal-type gate. It is designed to accumulate, store, and deliver water by gravity to an open ditch or non-pressurized pipeline, in excess of 5 cfs. It will have a top width of 12ft and centerline length of embankment of 5,280 feet. Average fill of 10 feet and the side slopes will be no steeper than 3 H to 1 V inside and out. It will be built with approximately 105,000 cubic yards of on-site material. It will have a maximum water depth of 8 feet with 2 feet of freeboard and no auxiliary spillway. Volume is approximately 320 ac-ft (104,500,000 gallons). Critical Area Planting and Mulching is required.

Resource Concern: Insufficient Water - Inefficient use of irrigation water.

Associated Practices: 521 - Pond Sealing or Lining (various); 320 - Irrigation Canal or Lateral; 430 - Irrigation Pipeline; 428 - Irrigation Ditch Lining; 533 - Pumping Plant; 440 series - Irrigation Systems; 447 - Irrigation System, Tailwater Recovery; 378 - Pond; 484 - Mulching; and 342 - Critical Area Planting.

Before Situation:

Current system relies on an intermittent or low-flow rate water source. This results in untimely and/or inefficient water application.

After Situation:

The rectangular reservoir will be built on a relatively flat site and be used to accumulate and store water for timely application through an irrigation system. The water source could be a stream or an irrigation district canal.

Scenario Feature Measure: Volume of Compacted Earthfill

Scenario Unit: Cubic Yards

Scenario Typical Size: 105,000

Scenario Cost: \$173,248.06

Scenario Cost/Unit: \$1.65

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price (\$/unit)	Quantity	Cost
Equipment/Installation						
Hydraulic Excavator, 2 CY	932	Track mounted hydraulic excavator with bucket capacity range of 1.5 to 2.5 CY. Equipment and power unit costs. Labor not included.	Hour	\$172.10	4	\$688.40
Stripping and stockpiling, topsoil	1199	Stripping and stockpiling of topsoil adjacent to stripping area. Includes equipment and labor.	Cubic Yard	\$0.78	12907	\$10,067.46
Tractor, agricultural, 360 HP	1205	Agricultural tractor with horsepower range of 340 to 390. Equipment and power unit costs. Labor not included.	Hour	\$133.74	630	\$84,256.20
Scraper, pull, 15 CY	1207	Pull type earthmoving scraper with 15 CY capacity. Does not include pulling equipment or labor. Add Tractor or Dozer, 260 HP typically required for single scraper.	Hour	\$19.95	630	\$12,568.50
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	\$33.55		\$0.00
Scraper, pull, 18 CY	2093	Pull type earthmoving scraper with 18 CY capacity. Does not include pulling equipment or labor. Add Tractor or Dozer, 260 HP typically required for single scraper.	Hour	\$22.46	630	\$14,149.80
Dozer, 80 HP	929	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	\$60.66	15	\$909.90
Portable Welder	1407	Portable field welder. Equipment only. Labor not included.	Hour	\$18.18	8	\$145.44
Foregone Income						
FI, Rice	1974	Rice is Primary Crop	Acre	\$553.10	40	\$22,124.00
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	\$31.56	16	\$504.96
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	\$17.54	16	\$280.64

Labor

Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12", Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	\$22.13	15	\$331.95
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12", Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	\$22.13	4	\$88.52
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12", Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	\$22.13	630	\$13,941.90
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	\$24.49	8	\$195.92

Materials

Screw gate, cast iron, 18" diameter, 10/0 head	1917	18" diameter cast iron screw (canal) gate rated at 10 seating head 0 feet unseating head. Materials only.	Each	\$1,021.26	1	\$1,021.26
Pipe, Steel, 18", Std Wt	1366	Materials: - 18" - Steel Std Wt	Foot	\$89.32	100	\$8,932.00
Catwalk, metal	1918	Metal pedestrian walk way giving access to the valve on a structure, typically 3' wide with railing. Materials only.	Foot	\$56.17	50	\$2,808.50

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	\$232.71	1	\$232.71
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Practice: 436 - Irrigation Reservoir**Scenario: #2 - Delta Embankment Reservoir with Hauling****Scenario Description:**

This is a very large embankment reservoir with a 18" diameter drain pipe through the embankment controlled by a canal-type gate. It is designed to accumulate, store, and deliver water by gravity to an open ditch or non-pressurized pipeline, in excess of 5 cfs. It will have a top width of 12ft and centerline length of embankment of 5,280 feet. Average fill of 10 feet and the side slopes will be no steeper than 3 H to 1 V inside and out. It will be built with approximately 105,000 cubic yards of on-site material. It will have a maximum water depth of 8 feet with 2 feet of freeboard and no auxiliary spillway. Volume is approximately 320 ac-ft (104,500,000 gallons). Critical Area Planting and Mulching is required.

Resource Concern: Insufficient Water - Inefficient use of irrigation water.

Associated Practices: 521 - Pond Sealing or Lining (various); 320 - Irrigation Canal or Lateral; 430 - Irrigation Pipeline; 428 - Irrigation Ditch Lining; 533 - Pumping Plant; 440 series - Irrigation Systems; 447 - Irrigation System, Tailwater Recovery; 378 - Pond; 484 - Mulching; and 342 - Critical Area Planting.

Before Situation:

Current system relies on an intermittent or low-flow rate water source. This results in untimely and/or inefficient water application.

After Situation:

The rectangular reservoir will be built on a relatively flat site and be used to accumulate and store water for timely application through an irrigation system. The water source could be a stream or an irrigation district canal.

Scenario Feature Measure: Volume of Compacted Earthfill

Scenario Unit: Cubic Yards

Scenario Typical Size: 105,000

Scenario Cost: \$203,765.16

Scenario Cost/Unit: \$1.94

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price (\$/unit)	Quantity	Cost
Equipment/Installation						
Hydraulic Excavator, 2 CY	932	Track mounted hydraulic excavator with bucket capacity range of 1.5 to 2.5 CY. Equipment and power unit costs. Labor not included.	Hour	\$172.10	4	\$688.40
Hauling, bulk, highway truck	1615	Hauling of bulk earthfill, rockfill, waste or debris. One-way travel distance using fully loaded highway dump trucks (typically 16 CY or 20 TN capacity). Includes equipment and labor for truck only. Does not include cost for loading truck.	Cubic Yard Mile	\$0.29	105000	\$30,450.00
Scraper, pull, 15 CY	1207	Pull type earthmoving scraper with 15 CY capacity. Does not include pulling equipment or labor. Add Tractor or Dozer, 260 HP typically required for single scraper.	Hour	\$19.95	630	\$12,568.50
Tractor, agricultural, 360 HP	1205	Agricultural tractor with horsepower range of 340 to 390. Equipment and power unit costs. Labor not included.	Hour	\$133.74	630	\$84,256.20
Stripping and stockpiling, topsoil	1199	Stripping and stockpiling of topsoil adjacent to stripping area. Includes equipment and labor.	Cubic Yard	\$0.78	12907	\$10,067.46
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	\$33.55	2	\$67.10
Dozer, 80 HP	929	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	\$60.66	15	\$909.90
Portable Welder	1407	Portable field welder. Equipment only. Labor not included.	Hour	\$18.18	8	\$145.44
Scraper, pull, 18 CY	2093	Pull type earthmoving scraper with 18 CY capacity. Does not include pulling equipment or labor. Add Tractor or Dozer, 260 HP typically required for single scraper.	Hour	\$22.46	630	\$14,149.80
Foregone Income						
Fl, Rice	1974	Rice is Primary Crop	Acre	\$553.10	40	\$22,124.00
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	\$24.49	8	\$195.92

Labor

Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12", Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	\$22.13	4	\$88.52
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12", Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	\$22.13	15	\$331.95
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12", Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	\$22.13	630	\$13,941.90
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	\$17.54	16	\$280.64
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	\$31.56	16	\$504.96

Materials

Catwalk, metal	1918	Metal pedestrian walk way giving access to the valve on a structure, typically 3' wide with railing. Materials only.	Foot	\$56.17	50	\$2,808.50
Screw gate, cast iron, 18" diameter, 10/0 head	1917	18" diameter cast iron screw (canal) gate rated at 10 seating head 0 feet unseating head. Materials only.	Each	\$1,021.26	1	\$1,021.26
Pipe, Steel, 18", Std Wt	1366	Materials: - 18" - Steel Std Wt	Foot	\$89.32	100	\$8,932.00

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	\$232.71	1	\$232.71
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Practice: 436 - Irrigation Reservoir**Scenario: #3 - Steel Tank****Scenario Description:**

A 20,000 Gallon, above ground, enclosed fabricated Steel or bottomless Corrugated Metal (with plastic liner and cover) tank with fittings, is installed on 6" of well compacted drain rock support pad with sand padding (CM tank), to store water from a reliable source for irrigation of an area less than 5 acres. The scenario assumes the typical dimensions of the tank are 24 feet in diameter and 6 feet tall. The scenario also assumes a 28 feet diameter gravel base pad to extend a minimum of 2 feet past the base of tank for adequate foundation support. This cost estimate scenario is for cost of the tank and pad only and does not include the cost for pumps, pipe, or fittings for the pipeline.

Resource Concern: Insufficient Water - Inefficient use of irrigation water.

Associated Practices: 430 - Irrigation Pipeline; 441 - Irrigation System, Microirrigation; 442 - Irrigation System, Sprinkler; 533 - Pumping Plant; 447 - Irrigation System, Tailwater Recovery.

Before Situation:

Insufficient volume of water to complete an irrigation cycle at the required flow rate.

After Situation:

An above ground, enclosed fabricated steel or bottomless corrugated metal tank (with plastic liner and cover), capable of withstanding the elements, is used to accumulate and store water between irrigation cycles for a small irrigation system. This allows for an improved flow rate and timing of water application. Sources of water could be a well, a domestic water system, a very large roof area, a water ram , or a pump drawing water from a stream.

Scenario Feature Measure: Volume of Tank Storage

Scenario Unit: Gallons

Scenario Typical Size: 20,000

Scenario Cost: \$20,572.87

Scenario Cost/Unit: \$1.03

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price (\$/unit)	Quantity	Cost
Equipment/Installation						
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	\$38.95	10	\$389.50
Plate compactor	1915	Manually guided vibratroy plate compactor. Equipment only.	Hour	\$4.37	16	\$69.92
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12", Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	\$22.13	16	\$354.08
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	\$31.56	40	\$1,262.40
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	\$17.54	80	\$1,403.20
Materials						
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	\$29.39	8	\$235.12
Aggregate, Gravel, Ungraded, Quarry Run	1099	Includes materials, equipment and labor	Cubic yard	\$20.54	12	\$246.48
Tank, Corrugated Metal Storage, 20,000 gallon	1920	20,000 gallon capacity enclosed corrugated Metal Storage tank. Includes delivery to the site and anchoring material.	Each	\$16,018.23	1	\$16,018.23
Mobilization						
Mobilization, very small equipment	1137	Equipment that is small enough to be transported by a pick-up truck with typical weights less than 3,500 pounds. Can be multiple pieces of equipment if all hauled simultaneously.	Each	\$64.26	2	\$128.52
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	\$232.71	2	\$465.42

Practice: 436 - Irrigation Reservoir**Scenario: #4 - Plastic Tank****Scenario Description:**

A 3,000 Gallon, above-ground, High Density Polyethylene plastic enclosed tank, is installed on 6" of well-compacted drain rock or a 4" thick reinforced concrete support pad, to store water from a reliable source for irrigation of an area less than one acre. The scenario assumes the typical dimensions of the tank are 102" in diameter and 93" tall. The scenario also assumes a 126" diameter gravel base or concrete pad to extend a minimum of 12" past the base of tank for adequate foundation support. This cost estimate scenario is for cost of the tank and pad only and does not include estimate for pumps, pipe, or connecting fittings.

Resource Concern: Insufficient Water - Inefficient use of irrigation water.

Associated Practices: 430 - Irrigation Pipeline; 441 - Irrigation System, Microirrigation; 442 - Irrigation System, Sprinkler; 533 - Pumping Plant; 447 - Irrigation System, Tailwater Recovery.

Before Situation:

Insufficient volume of water to complete an irrigation cycle at the required flow rate.

After Situation:

An above-ground plastic tank, constructed to withstand the elements, is used to accumulate and store water between irrigation cycles for a very small irrigation system. This allows for an improved flow rate and timing of water application. Sources of water could be a well, a domestic water system, a large roof area, a water ram , or a pump drawing water from a stream.

Scenario Feature Measure: Volume of Tank Storage

Scenario Unit: Gallons

Scenario Typical Size: 3,000

Scenario Cost: \$3,915.22

Scenario Cost/Unit: \$1.31

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price (\$/unit)	Quantity	Cost
Equipment/Installation						
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	\$38.95	6	\$233.70
Plate compactor	1915	Manually guided vibratroy plate compactor. Equipment only.	Hour	\$4.37	4	\$17.48
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	\$31.56	16	\$504.96
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	\$17.54	32	\$561.28
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12", Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	\$22.13	6	\$132.78
Materials						
Tank, Poly Enclosed Storage, >1,000	1075	Water storage tanks. Includes materials and shipping only.	Gallon	\$0.61	3000	\$1,830.00
Aggregate, Gravel, Ungraded, Quarry Run	1099	Includes materials, equipment and labor	Cubic yard	\$20.54	2	\$41.08
Mobilization						
Mobilization, very small equipment	1137	Equipment that is small enough to be transported by a pick-up truck with typical weights less than 3,500 pounds. Can be multiple pieces of equipment if all hauled simultaneously.	Each	\$64.26	2	\$128.52
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	\$232.71	2	\$465.42

Practice: 436 - Irrigation Reservoir**Scenario: #5 - Fiberglass Tank****Scenario Description:**

A 10,000 Gallon above ground, enclosed, fiberglass tank, is installed on 6" of well compacted drain rock support pad. The tank is used to store water from a reliable source for irrigation of areas less than 3 acres. The scenario assumes the typical dimensions of the tank are 15 feet in diameter and 8 feet tall. The scenario also assumes a 19 feet diameter gravel base pad to extend a minimum of 2 feet past the base of tank for adequate foundation support. This cost estimate scenario is for cost of the tank and pad only and does not include estimate for pumps, pipe, fittings for the pipeline, or catchment area.

Resource Concern: Insufficient Water - Inefficient use of irrigation water.

Associated Practices: 430 - Irrigation Pipeline; 441 - Irrigation System, Microirrigation; 442 - Irrigation System, Sprinkler; 533 - Pumping Plant; 447 - Irrigation System, Tailwater Recovery.

Before Situation:

Insufficient volume of water to complete an irrigation cycle at the required flow rate.

After Situation:

A large fiberglass enclosed tank, capable of withstanding the elements, is used to accumulate and store water between irrigation cycles for a very small irrigation system. This allows for an improved flow rate and timing of water application and better efficiency. Sources of water could be a well, a domestic water system, a very large roof area, a water ram , or a pump drawing water from a stream.

Scenario Feature Measure: Volume of Tank Storage

Scenario Unit: Gallons

Scenario Typical Size: 10,000

Scenario Cost: \$10,379.79

Scenario Cost/Unit: \$1.04

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price (\$/unit)	Quantity	Cost
Equipment/Installation						
Plate compactor	1915	Manually guided vibratroy plate compactor. Equipment only.	Hour	\$4.37	4	\$17.48
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	\$38.95	8	\$311.60
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	\$31.56	24	\$757.44
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	\$17.54	40	\$701.60
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12", Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	\$22.13	8	\$177.04
Materials						
Aggregate, Gravel, Ungraded, Quarry Run	1099	Includes materials, equipment and labor	Cubic yard	\$20.54	6	\$123.24
Tank, Fiberglass Enclosed Storage, 10,000 gallon	1919	10,000 gallon capacity enclosed fiberglass water storage tank. Includes tank anchoring materials and delivery.	Each	\$7,697.45	1	\$7,697.45
Mobilization						
Mobilization, very small equipment	1137	Equipment that is small enough to be transported by a pick-up truck with typical weights less than 3,500 pounds. Can be multiple pieces of equipment if all hauled simultaneously.	Each	\$64.26	2	\$128.52
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	\$232.71	2	\$465.42